Cloud meets telecom & application in open source asterisk(IPPBX)

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Abstract— Here I have discussed possible models in this paper where cloud computing meets telecom development & provide application for next generation network & computing.
Each model has potential to work for upcoming development in clouds & telecom.
Each one has advantage & disadvantage. Telecom operator will adopt based on cost, infrastructure & their new approach.
Also I have proposed for running of Asterisk IPPBX on cloud which offer a cost-effective way to quickly gain the benefits of voice and data convergence.

Keywords: Service Provider(SP),Telecom Equipment(TE) Session Initiation Protocol (SIP), Voice Over Internet Protocol (VoIP), Internet Protocol Private Branch Exchange(IPPBX),Elastic Block Store (EBS) ,Elastic connection(EC2),Quality of Service(QoS)

I. INTRODUCTION (CLOUD COMPUTING & TELECOM)

Cloud computing is very much in discussion. It can be explained in words like highly scalable computing resources provided as an external service via internet on mostly pay as you go basis. Or simply a metaphor for the internet where one can use & pay only those services which are needed from the cloud.
Or we can just say services available on the network under feasibility to pay for them only for their use with availability of those whenever one needs them. When we say this we already merged cloud with telecom.
Telecom is not a new concept. There are many telecom vendors in this world providing many option starting from basic wired telephony to high speed mobile device, Internet of Things (IOT) through radio & data communication etc
Connectivity provided by telecom is core element without this cloud cannot exist.
But we rarely hear anyone talking about cloud with telecom & that's what we will try to do here.
Will cloud kill telecom? Is another question which was asked & answer is no. Rather we feel cloud with telecom will lead us to next generation of communication & network which will be easy to access, use, fast, secured & more economical.

Future need:
Both Telecom & cloud are moving faster in its use. It is predicted that mobile subscription will cross approx. 10 billion by 2017.Most will be using various data service available on various data center may be on various clouds on their own. This trigger huge growth in cloud computing & telecom both.
Cloud computing sector is trying to establish more & more on the contents it can provide to end users & as soon as possible. Product companies like Apple, micro soft, Google which offer their wide range of services via their cloud programing
Including service ranging from gaming to money transfer, voice to storage & security etc. Imagination is only limit here & which getting challenged every day.

We can see similar emphasis in telecom. Main focus is completely on providing faster & secured connection to all end user at same time reducing the hardware footprint .Companies like Huawei ,Cisco are working in various new design to reduce hardware cost & at same time providing more benefits to telecom service provider & finally to end user. Reduced hardware leads to new design with high capacity & complexity to accommodate the required connectivity requests from operator

CONCEPT OF CLOUD IN TELECOM:

The cloud can be public or private or hybrid including both public & private cloud builds separately. It has extremely useful characteristic like "On demand self service" or Resource pooling.It has ability to provide different services like SaaS, Paas or IaaS.

Software as a service (SaaS) provide the capability to the consumer to use various application provided by a cloud infrastructure owner. This is very common delivery model for CRM, ERP like application. Some of the know cloud providing service like iCloud & Amazon Web Services

Infrastructure as a service (IaaS) provide flexibility to the consumer allowing him to create & deploy his own application on cloud. Also some control over OS, storage & deployed applications. Some of the know application like Windows Azure Virtual machine, Google compute engine.

To make use of all cloud services, end user or consumer should have a reliable, secure, faster communication network in place. This facility is given by telecom vendors by

deploying their network equipment. But still this gives complication & more cost for end user. Usually Telecom operator buy equipment's from telecom vendor & provide possible best services from wired to mobile connectivity via radio access network & circuit switch data & packet switched data.

In below scope we will discuss that could be different working approach which we believe can be constructed using cloud & Telecom & that could be beneficial to telecom service provider & end user. Let us discuss two of such approach.

- Cloud at Telecom Equipment
- Cloud with high capacity Telecom equipment & optimized cloud solution

A. CLOUD AT TELECOM EQUIPMENT

- In this approach, operator can use telecom equipment from one or more telecom vendor by creating a cloud infrastructure
- The small cloud can be created based on SP's deployment plan as well as existing establishment by connecting the similar type of equipment's & sharing them cross cloud .For example an SP can create his own router cloud where they will have various resources like GGSN,GPRS,BRAS etc pooled together & offering services via cloud to operator.
- This will support storage & security feature in cloud
- Virtualized server, distributed storage with OS which we call virtualization, parallel computing can help in establishing cloud with DB solution
- Application platform created on telecom equipment can provide OSS/BSS on cloud along with other services like IPTV,App store & virtual desktop

Benefits:

- This gives flexibility for operator to use his existing setup which can be cost saving for operator
- Operator can have their own cloud services for end user
- A better cloud based administration & BSS can be possible via this implementation
- With good planning & implementation, this can offer better network performance & better connectivity

Disadvantages:

- initial establishment with connection of all equipment could be time consuming
- Cloud maintenance service could be complicated Interworking & sync issue within network equipment which can be problematic during downtime.

B. CLOUD WITH HIGH CAPACITY TELECOM EQUIPMENT & OPTIMIZED CLOUD SOLUTION:

- This approach is different than above one. This is mainly used by telecom SP with very high capacity equipment from single telecom vender.
- A single telecom equipment vendor will provide end to end solution which can host, build & connect cloud for operator & also provide support for long term
- Vendor can install high capacity hardware with high speed connectivity
- Connectivity will be key for cloud & in this approach various technique can be used by vendor to provide better connectivity
- Vendor can decide to optimize Abis interface between BSC & BTS to achieve more data rate.
- Telecom vendors can support operator in feature like priorities traffic & better coverage for connectivity
- This can be used with optimize solution which supports caching contents. He can deploy software solution with cache feature to various NW nod & at various levels to provide better continuity to user.
- Operator can opt to have the complete cloud developed by vendor.

Benefits:

- This will provide high reduction in cost for the operator as solution need less space which will reduce S/W license
- This can help in cooling & power saving & also operation cost saving.
- This will reduce time to market as deployment
- SaaS provided by this cloud will allow operator to offer rich contents & value added services to end user.
- PaaS provided by this cloud will allow operator to offer to use exceptional mobile broadband & cloud computing services to end user
- This provides fixed & mobile access to cloud with high speed connectivity & maintaining good QoS.
- It has reliable access & enhanced security
- This provide value add service like IP TV meter reading, app store etc

Disadvantage:

- Need to purchase Telecom equipment from Single vendor
- Need to upgrade its existing infrastructure to become adaptable with cloud configuration

II. PRPOSAL FOR RUNNING ASTERISK IPPBX ON CLOUD:

The following are a prerequisite to running an asterisk instance on the EC2

- Web Services (AWS) account
- Firefox with the Elasticfox Extension for EC2;
- The latest asterisk release

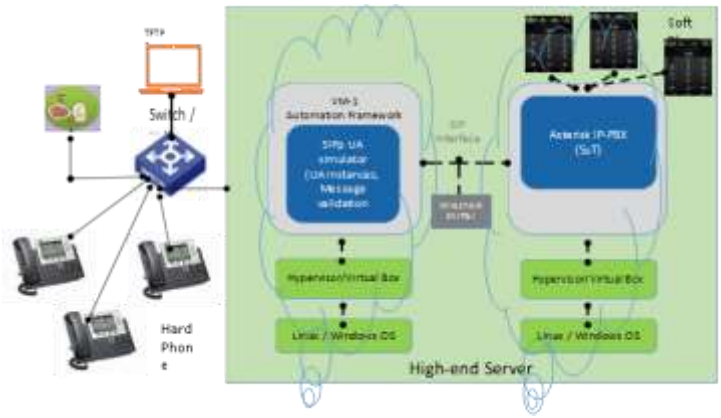
Instance Configuration - configuring EC2 instance with one of kernels available by default. Different kernel options are available with variety of compiled drivers.

- **IP Configuration** – An elastic IP should be assigned for long term applications. An elastic IP is called a static IP address which should be configured to the EC2 instance whenever the instance runs. This ensures that the instance always has the same IP address. Charges money for the duration the elastic IP address is reserved. In other way you can use dynamic DNS and update the DNS entries with the EC2 IP whenever it runs

- **Asterisk Installation** – Asterisk installation is provided by many vendors & available in public domain. Software like postgresql, net-netsnmp and openldap should be installed first if a kernel installation is chosen as mentioned here. Alternatively, CentoS or Fedora Core images can also be chosen to make the installation process painless. A recommended step is to install the Digium Asterisk Hardware Device Interface (dahdi). Although the instance do not have any specialized hardware, the timing source that comes with the DAHDI is useful for time sensitive applications such as conferencing on asterisk.

- **EBS Creation** - Lastly, Elastic Block Store (EBS) volumes should be created and associated with the EC2 instance for storing Asterisk configuration, voicemail boxes and logs.

These instances can be very easily customized to connect to a VoIP provider for providing landline/mobile terminations. Asterisk provides configuration options through which the instance can be optimized to route RTP traffic end to end and not through the Cloud, except when transcoding/conferencing is required. Transcoding can almost completely be eliminated by ensuring the SIP endpoints used with the system uses the same Codecs as the VoIP provider which provides the gateway services.



(Fig: Asterisk IPPBX on Cloud)

Advantages:

1. Running the PBX of your small business hosted on the cloud. As you can see above this is an extremely affordable option from cost, installation & complexity point of view. Moreover, you can control the scale on as needed basis. The PBX can be scaled up, multiple instances run as more and more users get added.

2. Running Call Center/Support Desk applications – There are a host of support center applications based on open source, these can be easily customized to run on providers such as GoGrid. Again, the flexibility in scaling the solution provides applications such as these ideal candidates for the cloud.

3. Quality Assurance for your open source application – For startups in the VoIP area looking for quick turnaround, the Cloud Computing platforms are amazing test beds. They do not require capital outlays in expensive racks/blade servers, but the software can be tested easily and quickly on the cloud test beds. Once the QA cycles are run, the instances can be scaled down to reduce costs.

4. 3rd party Call control based Systems. It's possible to run virtualized instances of Asterisk and offer call connect/conferencing functionality very easily. The solution will scale up/down depending on the demands for conference bridges and call reservations

III. *CHALLAGES IN CLOUD WITH TELECOM*

- Configuration of security polices in cloud network

- Private law & act under different jurisdiction can create issue as physical location of computing devices & storage resource falls under different geo.
- Other data security issues like misuse of globally stored data , stealing of saved data can exists
- This provokes to risk of transferring of confidential data to various destination which ultimately lead to potential data leak
- It can restrict end user to use only that services provided by that cloud vendor
- Downtime due to connectivity issue or any other access restriction will impact huge customer base with a ratio of quantities and units. For example, write "Temperature (K)," not "Temperature/K."

CONCLUSION

We have discussed two possible models in this paper where cloud computing meets telecom development & provide application for next generation network & computing.

Both of the model has potential to work for upcoming development in clouds & telecom

Each one has advantage & disadvantage. It is up to telecom companies to adopt based on cost, infrastructure & their new approach

"Cloud at Telecom Equipment" model provide great flexibility w.r.t. existing infrastructure for operator which leads cost reduction to him with quick time to market. In same time this model gives weak security & complexity in maintenance.

"Cloud with high capacity Telecom equipment & optimized cloud solution" model provides cloud with high capacity telecom equipment & optimized solution will be beneficial approach when service provider wants to have good level of security & good control over his network. This gives better flexibility towards using his application & services provided by telecom vendor. This provides better maintenance to the cloud & its infrastructure as single vendor will build cloud
Of course this will be provided by telecom vendor who has established quality of service, reputation, reliability, credibility, security.

As an end user we always want to have access to best & latest technology. Both cloud computing & telecom working on huge development in their respective to address customer need. Combination of both can certainly be a big benefits for end user. Connectivity will be deciding factor for service provider to use suitable approach.

Implementation proposal of Asterisk IPPBX on cloud is economically affordable & provide quality assurance with open source application.

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